IN THE CLAIMS:

Please amend the claims as follows.

1. (Currently Amended) A network node circuit for use in wavelength division multiplexing (WDM) optical networks to allow utilization of a wide optical communication band, the node circuit comprising:

a band splitter having an input to receive a plurality of optical signals sent on a corresponding plurality of wavelengths of an optical communication band, and to separate a first plurality of the optical signals within a first wavelength range <u>within an amplification band</u> of the optical communication band from a second plurality of the optical signals within a second wavelength range <u>outside the amplification band</u> of the optical communication band;

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a cross-connect circuit having input ports to receive the first and second pluralities of the optical signals and to route the first and second pluralities of the optical signals through the cross-connect circuit to targeted output ports; and

a band combiner coupled to the cross-connect circuit to receive the first and second pluralities of the optical signals, and to combine the first and second pluralities of the optical signals into an aggregate plurality of optical signals for transmission from the network node.

2. (Original) The node circuit as in Claim 1, wherein the first wavelength range corresponds to a range of wavelengths capable of being optically amplified.

3. (Original) The node circuit as in Claim 2, wherein the range of wavelengths capable of being optically amplified corresponds to a range of wavelengths capable of being amplified by erbium-doped fiber amplifiers.

4. (Original) The node circuit as in Claim 2, wherein the second wavelength range corresponds to the wavelengths outside of the first range of wavelengths.

5. (Original) The node circuit as in Claim 4, wherein the second wavelength range is not contiguous and comprises wavelength ranges on both sides of the first wavelength range.

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6. (Original) The node circuit as in Claim 1, wherein the wide optical communication band is in a low attenuation region of an optical transmission spectrum comprising wavelengths from approximately 1240 nanometers to approximately 1610 nanometers.

7. (Original) The node circuit as in Claim 1, further comprising optical amplifiers coupled to the band splitter to receive and optically amplify the optical signals within the first wavelength range.

8. (Original) The node circuit as in Claim 7, wherein the optical amplifiers

comprise erbium-doped fiber amplifiers.

9. (Original) The node circuit as in Claim 1, further comprising OMS-SPRING protection fibers for the optical signals within the first wavelength range.

10. (Original) The node circuit as in Claim 9, further comprising protection switching circuitry coupled to the cross-connect circuit to collectively switch the optical signals within the first wavelength range to protection fibers, in the event of a failure of a working fiber upon which the optical signals within the first wavelength range are being transmitted.

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11. (Original) The node circuit as in Claim 1, further comprising a linear protection circuit for the optical signals within the second wavelength range.

12. (Original) The node circuit as in Claim 11, wherein the linear protection circuit comprises a 1+1 linear protection circuit.

13. (Currently Amended) ~~The node circuit as in Claim 11~~, A network node circuit for use in wavelength division multiplexing (WDM) optical networks to allow utilization of a wide optical communication band, the node circuit comprising:

a band splitter having an input to receive a plurality of optical signals sent on a

corresponding plurality of wavelengths of an optical communication band, and to separate a first plurality of the optical signals within a first wavelength range of the optical communication band from a second plurality of the optical signals within a second wavelength range of the optical communication band;

a cross-connect circuit having input ports to receive the first and second pluralities of the optical signals and to route the first and second pluralities of the optical signals through the cross-connect circuit to targeted output ports;

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a band combiner coupled to the cross-connect circuit to receive the first and second pluralities of the optical signals, and to combine the first and second pluralities of the optical signals into an aggregate plurality of optical signals for transmission from the network node; and

a linear protection circuit for the optical signals within the second wavelength range,

wherein the linear protection circuit comprises a signal duplicator for each of the optical signals within the second wavelength range to respectively transmit each of a duplicated set of the optical signals within the second wavelength range onto each of two working fibers supplied to the network by the node circuit.

14. (Original) The node circuit as in Claim 13, wherein each of the duplicated sets of the optical signals within the second wavelength range are transmitted on different wavelengths from one another.

15. (Original) The node circuit as in Claim 13, wherein each of the duplicated sets of the optical signals within the second wavelength range are transmitted on a common wavelength.

16. (Original) The node circuit as in Claim 1, wherein the band splitter comprises a long period fiber Bragg grating having a Bragg resonance wavelength band substantially equal to the first wavelength range to reflect the optical signals within the first wavelength range onto a first signal path, while allowing the optical signals within the second wavelength range to pass through to a second signal path.

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17. (Original) The node circuit as in Claim 1, wherein the band combiner comprises a long period fiber Bragg grating having a Bragg resonance wavelength band substantially equal to the first wavelength range to reflect the optical signals within the first wavelength range, while allowing the optical signals within the second wavelength range to pass through the long period fiber Bragg grating, wherein the reflected optical signals within the first wavelength range and the passed optical signals within the second wavelength range are collectively combined on a common signal path to provide the aggregate plurality of optical signals for transmission from the network node.

18. (Original) The node circuit as in Claim 1, wherein the cross-connect circuit is

an optical cross-connect circuit.

19. (Original) The node circuit as in Claim 1, further comprising an optical add/drop multiplexer to selectively add additional optical signals to the first and second plurality of optical signals within the first and second wavelength ranges respectively, and to selectively drop selected ones of the first and second plurality of optical signals within the first and second wavelength ranges respectively.

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20. (Original) A network node circuit for use in wavelength division multiplexing (WDM) optical networks to allow utilization of a wide optical communication band, the node circuit comprising:

band splitting means for receiving a plurality of optical signals sent on

wavelengths within the wide optical communication band, and for separating in-band signals corresponding to wavelengths within an erbium-doped fiber amplification (EDFA) band from out-band signals corresponding to wavelengths outside of the EDFA band;

means for routing the in-band and out-band signals node to targeted in-band and out-band output ports respectively;

first protection means for rerouting the in-band signals through the optical network upon detection of a link failure associated with the targeted in-band output port;

second protection means for supplying redundant transmission paths for the out-

band signals through the optical network upon detection of a link failure associated with the targeted out-band output port; and

band combination means for receiving the in-band and the out-band signals, and for combining the in-band and the out-band signals into an aggregation of optical signals for transmission from the network node.

21. (Original) A method for fully utilizing an optical spectrum spanning a predefined low attenuation region of an optical transmission spectrum, for communicating information on optical fibers of an optical network, the method comprising:

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separating optical signals within the predefined low-attenuation region into in-band and out-band optical signals, wherein the in-band signals substantially correspond to a first wavelength range within the predefined low-attenuation region designated for optical amplification, and wherein the out-band signals substantially correspond to a second wavelength range within the predefined low-attenuation region and exclusive of the first wavelength range;

routing the in-band and out-band optical signals to in-band and out-band output ports associated with destination nodes for the in-band and out-band signals respectively; and

combining the in-band and out-band optical signals from the in-band and out-band output ports to provide a united collection of the optical signals for collective

transmission.

22. (Original) The method of Claim 21, further comprising collectively switching all of the in-band signals from the optical fibers to optical protection fibers upon recognition of a failure of one or more of the optical fibers.

23. (Original) The method of Claim 22, wherein collectively switching all of the in-band signals to optical protection fibers comprises collectively rerouting all of the in-band signals from the optical fibers to the optical protection fibers using OMS-SPRING protection.

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24. (Currently Amended) ~~The method of Claim 21,~~ A method for fully utilizing an optical spectrum spanning a predefined low attenuation region of an optical transmission spectrum, for communicating information on optical fibers of an optical network, the method comprising:

separating optical signals within the predefined low-attenuation region into in-band and out-band optical signals, wherein the in-band signals substantially correspond to a first wavelength range within the predefined low-attenuation region designated for optical amplification, and wherein the out-band signals substantially correspond to a second wavelength range within the predefined low-attenuation region and exclusive of the first wavelength range;

routing the in-band and out-band optical signals to in-band and out-band output ports associated with destination nodes for the in-band and out-band signals respectively;

combining the in-band and out-band optical signals from the in-band and out-band output ports to provide a united collection of the optical signals for collective transmission; and

separately duplicating each of the out-band signals, and transmitting each of the duplicate out-band signals on separate optical fibers of the network to provide redundancy.

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25. (Original) The method of Claim 24, further comprising selecting one of the duplicate out-band signals and disregarding the other duplicate out-band signals at a targeted node of the optical network.

26. (Original) The method of Claim 24, further comprising receiving one of the duplicate out-band signals upon a failure of the optical fiber providing the other duplicate out-band signals.

27. (Original) The method of Claim 24, wherein transmitting each of the duplicate out-band signals on separate optical fibers comprises providing optical channel protection using 1+1 sub-network connection protection (SNCP).

28. (Original) The method of Claim 21, wherein separating optical signals into in-band and out-band optical signals comprises:

reflecting the optical signals within the first wavelength range onto a first signal path; and

passing the optical signals within the second wavelength range onto a second signal path.

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29. (Original) The method of Claim 28, wherein:

reflecting the optical signals comprises directing the optical signals into a fiber Bragg grating having a reflection wavelength band substantially equal to the first wavelength range; and.

passing the optical signals comprises directing the optical signals into the fiber Bragg grating having a passband substantially equal to the second wavelength range.

30. (Original) The method of Claim 21, wherein combining the in-band and the out-band optical signals comprises:

reflecting the in-band signals from a first signal path onto a collective signal path; and

passing the out-band signals from a second signal path onto the collective signal path.

31. (Original) The method of Claim 30, wherein:

reflecting the in-band signals comprises directing the in-band signals into a fiber Bragg grating having a reflection wavelength band substantially equal to the first wavelength range; and

passing the out-band signals comprises directing the out-band signals into the fiber Bragg grating having a passband substantially equal to the second wavelength range.

32. (Currently Amended) A bi-directional optical network for communicating information in a predefined low-attenuation region of an optical transmission spectrum, comprising:

a pair of working optical fibers configured in a ring, each of the working fibers for transmitting the optical signals of the optical transmission spectrum in opposite directions;

a pair of ring protection fibers configured in a ring, each of the ring protection fibers associated with one of the working fibers for transmitting the optical signals of its corresponding working optical fiber upon a failure of its corresponding working optical fiber;

a plurality of network nodes each interposed along the rings of working optical fibers and the ring protection fibers to produce a ring network topology, each of the network nodes comprising:

(a) a band splitter having an input to receive a plurality of optical signals sent on a

corresponding plurality of wavelengths of an optical communication band, and to separate a first plurality of the optical signals within a first wavelength range within an amplification band of the optical communication band from a second plurality of the optical signals within a second wavelength range outside the amplification band of the optical communication band;

(b) a cross-connect circuit having input ports to receive the first and second pluralities of the optical signals and to route the first and second pluralities of the optical signals through the cross-connect circuit to targeted output ports; and

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(c) a band combiner coupled to the cross-connect circuit to receive the first and second pluralities of the optical signals, and to combine the first and second pluralities of the optical signals into an aggregate plurality of optical signals for transmission from the network node; and

a ring protection circuit coupled to the band splitter to switch the first plurality of optical signals from the working optical fiber to an associated ring protection fiber upon recognition of the failure of its corresponding working optical fiber.

33. (Currently Amended) ~~The bi-directional optical network as in Claim 32,~~ A bi-directional optical network for communicating information in a predefined low-attenuation region of an optical transmission spectrum, comprising:

a pair of working optical fibers configured in a ring, each of the working fibers for transmitting the optical signals of the optical transmission spectrum in opposite

directions;

a pair of ring protection fibers configured in a ring, each of the ring protection fibers associated with one of the working fibers for transmitting the optical signals of its corresponding working optical fiber upon a failure of its corresponding working optical fiber;

a plurality of network nodes each interposed along the rings of working optical fibers and the ring protection fibers to produce a ring network topology, each of the network nodes comprising:

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(a) a band splitter having an input to receive a plurality of optical signals sent on a corresponding plurality of wavelengths of an optical communication band, and to separate a first plurality of the optical signals within a first wavelength range of the optical communication band from a second plurality of the optical signals within a second wavelength range of the optical communication band;

(b) a cross-connect circuit having input ports to receive the first and second pluralities of the optical signals and to route the first and second pluralities of the optical signals through the cross-connect circuit to targeted output ports; and

(c) a band combiner coupled to the cross-connect circuit to receive the first and second pluralities of the optical signals, and to combine the first and second pluralities of the optical signals into an aggregate plurality of optical signals for transmission from the network node;

a ring protection circuit coupled to the band splitter to switch the first plurality of

optical signals from the working optical fiber to an associated ring protection fiber upon recognition of the failure of its corresponding working optical fiber; and

a signal duplication circuit coupled to the band splitter to duplicate each of the second plurality of optical signals and to transmit a first of the duplicate signals on a first of the pair of working fibers and a second of the duplicate signals on a second of the pair of working fibers.

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34. (Original) The bi-directional optical network as in Claim 33, wherein one or more additional ones of the network nodes are connected to the network nodes of the ring network topology such that an aggregate of the network nodes forms a mesh network topology.